How Bargaining Mediates Wage Determination: An Exploration of the Parameters of Wage Functions in a Pooled Time-Series Cross-Section Framework

Bernhard Kittel

01/3

Max-Planck-Institut für Gesellschaftsforschung
Paulstrasse 3
50676 Köln
Germany

Telephone 0221/2767-0
Fax 0221/2767-555
E-Mail info@mpi-fg-koeln.mpg.de
Home Page www.mpi-fg-koeln.mpg.de

MPIfG Discussion Paper 01/3
ISSN 0944–2073
July 2001

Abstract

The process of wage determination is mediated by the institutional framework of the labor market. Bargaining systems differ not only in their mode of governance, but also in the way that wages are related to unemployment, inflation, and productivity growth. Based on annual data for the period 1971–1996 from 20 OECD countries, the paper uses a pooled time-series cross-section model to show that bargaining modes affect the speed at which wages are adjusted and the extent to which macroeconomic factors affect wages. Contrary to the expectations of mainstream economics, uncoordinated bargaining does not turn out to be the most flexible mode. Pattern setting and peak-level coordination, if legally enforceable, are modes of labor market governance that are at least as flexible and responsive, if not more so. Hence these labor market institutions cannot be blamed for excessive rigidity.

Zusammenfassung

Der Lohnfindungsprozess ist abhängig von den institutionellen Rahmenbedingungen des Arbeitsmarktes. Lohnverhandlungssysteme unterscheiden sich nicht nur hinsichtlich der Interaktionsformen ihrer Akteure, sondern auch hinsichtlich der Art, wie Löhne auf Arbeitslosigkeit, Inflation und Produktivitätswachstum reagieren. Auf der Basis von jährlichen Daten von 20 OECD-Staaten für die Periode 1971–1996 zeigt der Aufsatz mit Hilfe einer Panel-Analyse, dass der Lohnverhandlungsmodus sowohl die Anpassungsgeschwindigkeit der Löhne als auch das Ausmaß des Effekts makroökonomischer Faktoren auf die Löhne beeinflusst. Im Gegensatz zur gängigen ökonomischen Erwartungen zeigt sich das nicht-koordinierte Lohnverhandlungssystem nicht als der flexibelste Modus. Sowohl Lohnführerschaft als auch dachverbandliche Koordinierung auf der Basis hoher Regierbarkeit führen zu mindestens ebenso oder flexibleren Anpassungsleistungen des Arbeitsmarktes. Hieraus folgt, dass diese Arbeitsmarktinstitutionen nicht als Ursachen exzessiver Rigidität herangezogen werden können.

Contents

1 Introduction[1]

Labor market institutions have been the focus of intense debate in comparative political economy. Wage restraint as a mechanism for improving international competitiveness has been on the agenda of industrial relations for a long time in many OECD countries. "During the 1960s […] and especially during the 1970s, moderation of real wages was urged on the grounds that it was necessary to increase or restore international competitiveness and profitability […]" (Flanagan et al. 1983: 29), although the extent to which countries have been able to attain this goal has varied. Needless to say, this concern further increased during the 1980s and 1990s (see, e.g., Dore et al. 1994). In consequence, "labour economics and the institutions and rules that govern labour markets have moved from the periphery to the centre of economic discourse" (Freeman 1998: 3).

Comparative studies attempting to explain differences in macroeconomic performance by the institutional framework of the labor market, in particular wage bargaining institutions, have become a veritable boom industry. In political economy, quantitative research designs based on increasingly sophisticated operationalizations and statistical techniques have obtained varying results, depending on the conceptualization of the dependent and independent variables, the model specification, the countries included, the time period covered, and also the choice of method (e.g., Calmfors / Driffill 1988; Golden 1993; Hall / Franzese 1998; Iversen 1999). Although most of them agree that wage coordination improves the ability of countries to cope with economic problems, other studies tend to suggest that decentralized and deregulated labor markets actually perform better (see, e.g., Siebert 1997). Recent critical appraisals have found that the evidence provided by both research traditions is not convincing (OECD 1997; Flanagan 1999). In particular, effects are highly dependent on framework conditions, notably on

1 Acknowledgments: An earlier version of this paper was presented at the Fifth International Conference on Logic and Methodology of the International Sociological Association, October 3–6, 2000, Zentralarchiv, University of Cologne and at the Conference on Internationalization and Democracy, November 17–18, 2000, Zentrum für Überfakuläre Forschung, University of Vienna. It is based on a MA thesis accepted at the Essex Summer School in Social Science Data Analysis. I would like to thank the Summer School, in particular Elinor Scarbrough, for help and encouragement. Simon Price, Ron Smith, Henrik Enderlein, and two referees have provided helpful suggestions on how to improve the paper. I would also like to thank Badi Baltagi for discussing the complexities of the panel structure in this data set with me. The data stem from the Internationalisation, Labour Relations, Competitiveness (ILC) project funded by the Austrian Science Fund and by the Austrian Ministry of Science and Transport. My thanks go to Franz Traxler for allowing me to use the data and for his comments. The usual disclaimers apply.

the interaction between external shocks and institutions (Blanchard / Wolfers 2000). Further, conditionalities and complexities within labor market institutions should also be taken into account (Kittel 2000).

Notwithstanding the many insights gained from these studies, two important aspects have been neglected. The first concerns the choice of the dependent variable. Most studies have focused on the effect that wage bargaining has on unemployment or inflation. This design has the disadvantage of using a measure of labor market performance that is only indirectly affected by wage bargaining. First, employment is hardly an issue over which employers and employees negotiate, since hiring and firing is usually an employers' prerogative (Layard et al. 1991: 91–96). Basically, bargaining concerns wages and working conditions.[2] Second, although both unemployment and inflation are affected by labor costs, factors exogenous to the labor market may also influence their level and development. For example, government policy may explicitly aim at reducing unemployment (Compston 1997) by various measures ranging from public employment and active labor market policies, such as training, to encouraging certain groups of the population to leave the labor market altogether. Similarly, the inflationary pressure of wage growth may be mediated by the policy of the central bank (Hall / Franzese 1998). It follows that the link between wage bargaining institutions and unemployment is not close enough to convincingly prove the effect in a quantitative comparative research design. Although intervening factors may be controlled for, this solution is often impractical in comparative studies because of the limited number of (independent) observations, limited variation in the crucial explanatory variables, or high degree of collinearity of core variables.[3] In the present paper, the focus is therefore on a variable which is directly affected by bargaining, i.e., wage growth (see also Traxler / Kittel 2000).

---

2 "Employment pacts" concluded in many European countries in the 1990s may be regarded as an exception. However, employers' concessions in the form of temporarily refraining from laying off workers, which are often rather weakly formulated, have often been the only price encompassing unions were able to obtain in return for accepting wage restraint during that period (see Hassel 2001).

3 The "many-variables (k), small number of observations (N)" problem also plagues this paper, since the specification that I end up with (Table 3) has a k:N ratio of about 1:7. This implies that the coefficient estimates may lack robustness. However, first, if we accept the claim that complexity needs to be explicitly modeled, there is little we can do about this except to wait for additional data. Second, I have experimented with various model specifications and periods that showed some effect on the coefficient estimates, in particular for bargaining modes with an exceptionally small number of observations, but did not alter the general conclusions drawn from the part of the analysis presented in this paper.

The second factor that has been neglected in this debate is the effect wage bargaining institutions may have on how the labor market functions. Here, ideas from the debate in labor economics may fill the gap in political economy (Flanagan 1999). If we wish to understand the impact of wage bargaining institutions on economic performance, we need to know not only how they influence the outcome, but also whether and how they influence the way in which the outcome is reached. Much research has recently been focused on the effect of trade union structure and bargaining coordination on specific intermediate dimensions of the labor market – notably pay inequality (Rueda / Pontusson 2000; Wallerstein 1999), labor reallocation (Bertola / Rogerson 1997), labor supply (Nickell / Layard 1997), and the insider-outsider problem (Lindbeck / Snower 2001). In general, these studies suggest that these characteristics of the labor market are indeed affected by institutions. Further, intervening factors, such as various dimensions of the legal framework of the labor market, appear to matter (Nickell 1997). However, I am not aware of any comparative work that focuses on systematic differences between institutional settings in the way in which wage growth is determined. From this perspective, the "parameters" of the labor market refer to aspects such as effect size, direction, lags, and stickiness. In other words, the term "parameter" is taken literally in that it is the coefficients in a wage equation that are expected to differ systematically across bargaining modes.

This study thus attempts to shed some light on the impact of wage bargaining modes on the effect that "exogenous" economic variables have on wages. Hence it introduces a core idea from the labor economics debate into comparative political economy by developing the proposition that wage bargaining not only affects performance in the sense of *outcome* but also in the sense of the *parameters* of the labor market. Methodologically, it explores the possibilities of pooled time-series cross-section analysis for assessing such relationships empirically.

The analysis covers the period 1970–1996 in 20 OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States). The endpoints of the series are given by the availability of data for the bargaining variables that have been collected by the Internationalisation, Labour Relations, Competitiveness (ILC) project (Traxler et al. 2001).

The approach taken in this study differs from the ILC project in two respects. First, in contrast to the ILC project design, which is based on more aggregated periods covering several years, this analysis explores the underlying annual data. Second, while the ILC project was concerned with the institutional dimensions of the labor market and with an analysis of their performance effects, this study focuses on the effect of wage bargaining on the economic parameters of the labor

market. This paper therefore attempts to shed some light on the "black box" of the labor market.

The paper is structured as follows. I begin by discussing the basic economic determinants of labor cost developments and the conceptualization of the wage bargaining modes. This is followed by a section presenting a bargaining mode-specific labor cost model using the idea of the Seemingly Unrelated Regressions (SUR) model for comparing the differences in the way labor costs are determined across bargaining patterns. The findings are discussed and summarized in the conclusion.

2 Bargaining and Wage Determination: The Analytical Perspective

2.1 Wage Growth and the Two Dimensions of Wage Flexibility

In most OECD countries, wages are not set individually but negotiated collectively between employers and trade unions. In fact, wages are the single most important issue in collective bargaining (Layard et al. 1991: 91). Hence, if different bargaining modes have any effect on the labor market at all, they should affect wage growth. There are several different ways of measuring wage growth. Given that the ultimate aim of this study is to analyze the impact of labor relations on the parameters of the labor market, the relevant measure is nominal wages since this is the object of negotiations between employers and employees (see Traxler / Kittel 2000).[4] A direct measure of aggregate nominal wages would be earnings per employee, as published by the IMF. Unfortunately, data in this series are missing for several countries included in this sample.

An alternative is to use a broader concept of wages, i.e., labor costs, which are defined as the total cost incurred by the employer in the employment of labor (International Labour Office, Yearbook of Labour Statistics). This indicator is available annually in the OECD Economic Outlook for all sample countries covering the whole sample period. Although this indicator covers more than pure wages, notably social security payments, this does not diminish its validity. Particularly if the state is involved in peak-level negotiations, wage restraint may be traded against additional social benefits, which tend to put upward pressure on social security contributions. From an incomes policy perspective, social benefits may then be regarded as part of the total wage (Flanagan et al. 1983: 670–673; see also

4 Real wages would be more interesting if wages are used as some kind of welfare performance indicator, for example.

Dore, Boyer, and Mars 1994). Labor costs thus include a variety of aspects which are not the subject of negotiations. However, in line with current practice in macroeconomics (see, e.g., Bean 1994: 577), I shall not deal with this issue in any detail here in order not to make the model more complicated than necessary. The plausibility of this assumption is empirically strengthened by the fact that the pooled correlation coefficient between growth rates of labor costs and the available wage data in the period 1971–1996 is 0.92.

Ultimately, this paper aims to explain the way in which wage growth adjusts to changes in exogenous variables. This is what is meant by wage flexibility. However, I contend that wage flexibility is an ambiguous notion because it can be conceptualized in three ways, all represented by specific coefficients in the wage equation. On the one hand, flexibility is thought of as the speed of adjustment to external shocks: the faster wage growth adjusts to new conditions in terms of speed of adaptation and period needed to react, the more flexible it is. On the other hand, flexibility can also be thought of as the size of the adjustment to external shocks, that is, the amount of wage restraint or wage pressure induced by a shift in external conditions. In an autoregressive model specification, the coefficient of the lagged dependent variable represents the "stickiness" of the adjustment process: the higher the coefficient, the more an external effect is spread out over time. Hence the most flexible adjustment is attained if the autoregressive component approaches zero. I use the term "adaptability" when referring to this dimension. The time needed to react to external shocks is represented by the lag on the effect. In order to stress the speed dimension of flexibility, I call this dimension "reactivity." The third dimension, size of adjustment, is represented by the coefficient of the exogenous variables in the model. In this dimension, flexibility increases with the deviation of the coefficient from zero. I refer to this dimension as "responsiveness." When referring to more than one dimension at once, I continue to use the term flexibility or, if more appropriate, its opposite, rigidity. Hence empirically measured wage flexibility increases with a decreasing autoregressive component, a decrease in the lag length, and an increasing coefficient of exogenous variables.

2.2 The Economic Determinants of Wage Growth

Wage negotiations between employers and employees are not held in a void but in an economic environment that influences the strategies and the relative positions of the bargaining parties. Thus, though economic conditions have an effect on wages, this effect is mediated by negotiations between mostly corporate actors – trade unions and employers' associations. The extent to which this mediation process influences relationships and outcomes is the main substantive focus of

this paper. Before reflecting on the bargaining process, it is therefore necessary to specify a model which represents the economic relationships. Different modes of wage setting are then discussed.

Macroeconomic wage equations usually make wage increases dependent on expected price increases, unemployment, and labor productivity, while various factors that are assumed to influence the mark-up over the reservation wage are sometimes also included (see, e.g., Bean 1994: 579–581; Blanchard / Katz 1997: 60–61; Nickell 1998: 806). In most of these accounts, wage equations are not an aim in themselves, but constitute intermediate steps in a structural model describing some aspect of macroeconomic performance (notably price inflation or unemployment). I will take a more restricted perspective here in order to keep the model as simple as possible and will focus on the wage equation, more specifically on the effect of unemployment changes, price inflation, and productivity growth on wage growth.[5]

First, a basic precondition of wage growth is growth of labor productivity. It is the source of economic prosperity, and growth of aggregate welfare is only possible if output per worker increases. Since labor productivity growth is the result of the joint effort of employers (by investing in more productive equipment and work organization) and employees (by working harder or more efficiently), both have a reasonable claim for a share in the increase of added value. This implies that negotiated wages will tend to follow labor productivity, though with a certain discount and perhaps a certain lag. How fast wages react to productivity growth may be an issue of debate. Given that nominal wage increases are the result of bargaining processes, the rationality assumption of both workers and employers suggests that they take into account both past and expected developments of productivity. Furthermore, bargaining takes place in advance on the basis of fairly precise knowledge about productivity growth up until the year before agreement is reached, some knowledge about current growth, and expectations about future productivity growth rates based on forecasts and provisional data.

Although it might be argued that current productivity-based wage increases should depend on last year's actual productivity growth because wage bargaining is usually conducted in advance, there are several reasons for claiming that the contemporaneous effect should be most relevant. At the macroeconomic level, expected productivity growth one year ahead is seldom far off from actually reached rates, although some deviations can be expected due to random shocks. Furthermore, wages adapt to actual productivity growth during the validity of a

5 It is true that this approach does not capture feedback loops and mutual causation. However, these issues are beyond the scope of this paper and would need further exploration.

wage agreement, e.g., via productivity or profit bonuses. Thus, based on expectations and ongoing corrections, wage growth should be positively linked to current productivity growth. However, this match may only be partial and deviations from expected productivity growth may appear in retrospect. In that case, either workers will demand their share of additional productivity growth or employers will insist on a discount in current wage increases to compensate for past setbacks in productivity growth. Wage growth will be adjusted accordingly, implying that there may also be lagged effects.

Second, wages are related to price increases. Trade unions aim at increasing the real income of their constituency and therefore include inflation in their wage demands. The speed of adjustment of prices to wages and wages to prices is an issue of intense debate. On the one hand, the link is usually conceptualized in mainstream macroeconomics as wage increases causing immediate price increases. Indeed, prices are more easily adapted to labor costs than vice versa because they are a firm's prerogative and are not subject to negotiations. Blanchard and Katz (1997: 60), for example, estimate a model in which present wages determine present price inflation but are themselves determined by past price inflation and present unemployment. This model seems plausible in the closed economy context if all firms are equally affected by wage increases. Empirically, it has been observed that during the early 1970s, "money wages ran significantly ahead of prices, particularly in the manufacturing sector, where world prices imposed a ceiling on the extent to which increased labour costs could be passed through into export prices" (Flanagan et al. 1983: 6). However, whether prices can easily be adapted to wages in the context of an open economy is less clear if prices are set on the world market.

On the other hand, other authors stress the importance of non-wage causes of price inflation (Clegg et al. 1986: 311–318). Given that price inflation is not solely determined by wage increases but also by monopolistic mark-up pricing in the goods market, cyclical demand pressure, and random supply shocks, growth of real wages will be less than nominal wage growth and may be even negative even though nominal wages rise. In consequence, employees will attempt to compensate for non-wage inflation not accounted for in the last bargaining round.[6] In some countries, schemes of wage indexation existed during at least part of the period considered here, e.g., the Italian *scala mobile* (Regalia / Regini 1998). In other countries, wages were adjusted via renegotiations of agreements or via wage drift. Thus inflation will be reflected in nominal wage growth. As in the above discussion with regard to productivity, short-term expected inflation

6 However, employers as a group also have an interest in increasing the real income of the population since producers in OECD member states have to consider negative effects of falling real wages on their aggregate domestic sales.

used in wage negotiations will be quite an accurate estimate of actual inflation, which will be empirically observable in the current effect of inflation on nominal wage growth. On the other hand, past inflation will influence wage negotiations too. Due to its incremental nature, the effect of price inflation on real disposable income is largely hidden (Mitchell 1993) and may thus be spread out over a longer period. However, the direction of this relationship in the context of wage bargaining is theoretically unclear. Negotiated wages will have to compensate for deviations from past expectations. If past inflation was higher than expected, negotiators may either wish to compensate for real wage losses and demand higher wage increases or attempt to curb wage increases in order to restrain future inflation. Thus the expected sign of lagged inflation is not determinate. Whether a strong effect of inflation on wages is advantageous or not is a matter of debate. On the one hand, it may be indicative of an upward wage-price spiral and hence a sign of malfunction of the labor market. On the other hand, a failure of wage growth to adapt to declining inflation rates would give the wage-price spiral new momentum. Hence an attempt would be made to increase the responsiveness of wages to inflation. Empirically, this asymmetry in the wage-inflation nexus leaves the issue indeterminate.

Third, while productivity growth and inflation define the range of possible wage settlements, unemployment affects the relative bargaining power of the labor market parties (Layard et al. 1991: 12–31). Hence the causal arrow between wages and employment not only points from wages to employment, as assumed by mainstream economics, but also in the opposite direction: “Employees who work in areas of high unemployment earn less, other things constant, than those who are surrounded by low unemployment” (Blanchflower / Oswald 1994: 360). In a longitudinal perspective, it is the change in unemployment which is most relevant: wage restraint will be stronger if unemployment rates are growing, while declining unemployment rates will increase wage pressure. The model should thus include changes in unemployment. Next year’s wages are negotiated in the context of current unemployment dynamics. These directly affect the bargaining power of workers and their inclination to use their power to the maximum (Flanagan et al. 1983: 25–29). Given that workers, seen as a collective agent, are directly affected by unemployment, they will react quickly to changing employment opportunities when they negotiate wage rates. Thus there is a plausible argument to be made for a single one-year lag on the effect of unemployment. However, the lag structure will be determined empirically.

In consequence, without detailing the lag structure, the economic model is thought to have the following form:

$$W = f(PTY, INF, UE)$$

where *W* is a measure of the annual growth rate of wages (in other words, wage inflation), *PTY* is a measure of the annual growth rate of labor productivity, *INF* is the growth rate of the annual consumer price index, and *UE* is the annual change in unemployment. Wage growth should be positively related to productivity and inflation, and inversely to unemployment.[7]

2.3 Wage Bargaining Modes

During the last two decades, it has become increasingly apparent that the pertinent model in conventional economic wisdom, which assumes a free and individualized market, does not capture core features of real-world economies. Although this simple model may be a useful heuristic tool to analyze the core economic processes in the labor market, real-world labor markets cannot be modeled as a place where supply and demand of isolated individuals meet; instead, they are structured by institutions. Given the asymmetric power relations in the labor market (Offe / Wiesenthal 1985), workers have an incentive to form trade unions for collective wage bargaining. By bargaining jointly, they are able to obtain higher wages than they would be able to via individual labor contracts and they are capable of lobbying in favor of legal rules that increase downward rigidity of wages.[8] For this reason, organized labor markets are said not to respond "flexibly" to economic pressures (Siebert 1997).

Thus, if real-world labor markets diverge from the ideal-type market model due to the existence of a variety of rigidities, the mode of wage determination is a core institution of contemporary economies. It not only determines the distribution of income between labor and capital and among different sections of labor, it also has consequences for overall macroeconomic performance.

The traditional approach to measuring wage bargaining coordination was developed by Calmfors and Driffill (1988).[9] The main problem of these measures is that

---

7 Like labor costs, the economic explanatory variables are obtained from the OECD Economic Outlook. Productivity growth is defined as the annual percentage change in gross volume output (GDP) per employee. Inflation is measured by the annual percentage change in the consumer price deflator because this is the relevant measure from the consumers' or employees' perspective. Finally, unemployment is measured as the annual change in the unstandardized unemployment rates published by the OECD.

8 There are other reasons for downward rigidity of wages, which are discussed under the headings of efficiency wages and implicit contracts (for overviews, see Newbery and Stiglitz 1987; Bean 1994).

9 For a more elaborate variant of their index, see Iversen (1999). For an overview of practically all related measurement concepts currently in discussion, see Kenworthy (2000).

they conceptually restrict coordination of collective bargaining to a one-dimensional indicator, i.e., bargaining centralization. With regard to trade union associations, Moene, Wallerstein, and Hoel (1993: 128) have argued that "[i]f the way workers are divided into unions matters, then one-dimensional indices of centralisation are misleading. Countries rank differently along different dimensions of centralisation." Hence the starting point of the approach developed by Traxler and Kittel (2000) is a more differentiated view of the wage bargaining system. They argue that previous concepts neglect the possibility of functional equivalents to centralized bargaining and fail to reflect the role of the state and the impact of framework conditions set by labor law. In consequence, they propose a new conceptualization of collective bargaining as the interplay of coordination attempts along a horizontal and a vertical dimension. Horizontally, the problem is how collective agreements are concluded. They distinguish six main patterns: (1) inter-associational (bipartite) coordination between peak associations, (2) intra-associational (internal) coordination within peak associations, (3) state-sponsored (tripartite) coordination between peak associations, (4) pattern setting by a dominant sector, (5) state-imposed coordination (e.g., a wage freeze), and (6) no coordination.

Wage coordination across the economy was widespread in OECD countries throughout the 1970s, 1980s, and 1990s. However, to the extent that effective wage restraint presupposes both horizontal and vertical coordination, the observed horizontal coordination patterns represent *attempts* at coordination initiated from "above" rather than effective coordination. Whether the attempts at horizontal coordination are effective depends on the extent to which the bargaining systems are governable in terms of vertical coordination.

In the vertical dimension, the problem of encompassing peak associations is how to make member associations comply with central wage agreements. Internal means of enforcement are either lacking or useless given the exit possibility of member organizations. Whether centrally agreed wage restraint does indeed translate into lower growth rates of labor costs thus depends on the availability of external conditions. Traxler and Kittel (2000) include two aspects in their measure which they call bargaining governability: the *legal enforceability* of collective agreements, making collective agreements binding for the signatories under labor law, and the existence of a *peace obligation* prohibiting industrial action during the term of a collective agreement. High governability combines legal enforceability of collective agreements and a peace obligation that is automatically inherent in any collective agreement. The peace obligation must include the employees' workplace representatives even if they are established as a body formally independent of and separate from the union organization. Low governability lacks either legal enforceability or the peace obligation.

Traxler and Kittel (2000) argue that three coordination patterns do not need governability to be effective. Horizontal coordination may rely on functional equivalents to bargaining governability. This involves state-enforced coordination when compliance with wage restraint is authoritatively enforced. Further, the need for vertical coordination decreases with growing decentralization of bargaining. If bargaining is uncoordinated horizontally, any vertical coordination becomes pointless. Lastly, pattern setting needs less vertical coordination than other, more centralized forms of horizontal coordination because the level of bargaining is already rather decentralized.

In contrast, bargaining governability is a crucial prerequisite for all coordination patterns in which central-level peak associations voluntarily assume the main burden of coordination. Bargaining governability is argued to be superior to both intra-union and bargaining centralization because it is not simply a hierarchical mechanism that transmits higher-level wage agreements down to the rank and file. Instead of imposing substantive agreements, bargaining governability constitutes certain rules of the game that leave the shopfloor as much freedom as is compatible with higher-level wage coordination. As most of these rules are guaranteed by the state, they can be less easily challenged by the shopfloor than the hierarchical order of union structures and bargaining levels. Voluntary peak-level coordination includes inter-associational, intra-associational, and state-sponsored coordination. Traxler and Kittel (2000) show that all forms of voluntary peak-level coordination were able to moderate wages when combined with high governability. By contrast, if voluntary peak-level coordination lacks high governability, wage growth is significantly above average.

These findings suggest that the 12 categories resulting from cross-classifying the coordination patterns with bargaining governability can be summarized as five categories. These will be called *bargaining modes* in the remainder of the paper: (1) peak-level coordination with low bargaining governability, (2) peak-level coordination with high bargaining governability, (3) pattern setting, (4) state-imposed wage coordination, and (5) uncoordinated bargaining. A classification of the 20 countries into the five categories based on an aggregation over three- to five-year periods is summarized in the Appendix. The annual data used in the present paper classify the countries according to the year in which the wage agreement concluded by a certain bargaining mode was valid. Hence, depending on the time of implementation of the contract, the wage rates were either negotiated and concluded in the year before or during the year of classification. These five categories are used to analyze the differences in the way labor costs are affected by unemployment, inflation, and productivity growth. Formally, the model developed in Sect. 2.2 is extended to give

$$W = f(PTY, INF, UE \mid BM),$$

where *W*, *PTY*, *INF*, and *UE* are defined as before and *BM* refers to the bargaining modes. The model thus assumes that the effect of the economic variables on wage growth is conditional on the mode of wage bargaining.

3 An Empirical Assessment of Wage Determination Parameters

3.1 The Economic Model

The standard approach to time-series analysis of stationary variables is to estimate a general Autoregressive Distributed Lag (ARDL) model (Greene 2000: 724–733) and to test down the specification. Pretesting the variables for autocorrelation in a pooled time-series cross-section framework yields significant first-order autocorrelation in all variables and significant second-order effects for inflation and unemployment changes. Hence, although there is little reason to expect lag lengths longer than 1 in annual data (Beck / Katz 1996), the starting specification will contain current values and two lags of all variables.

The issue of nonstationary variables is somewhat more ambiguous. There are currently no generally accepted methods for pretesting for unit roots in panel data (see Maddala / Wu 1999; Smith 2000). The Levin and Lin test including one lagged difference strongly rejects the null hypothesis of a unit root for both period means-corrected data and period and country means-corrected data.[10] Running augmented Dickey-Fuller tests with one lagged difference on the period means-corrected data for each country separately yields rather strong evidence against unit roots for the change in unemployment and productivity growth in most countries. The evidence against unit roots for labor cost growth rates and inflation is weaker, with more countries not reaching a τ-value below –3.00 (i.e., the 5 percent critical value for 25 observations). However, Culver and Papell (1997) reject the unit roots hypothesis for inflation in a similar panel situation, although they were unable to reject the unit roots hypothesis for the single time series. Since all variables used here are expressed as annual changes or growth rates, there is little theoretical reason to suspect that variables are nonstationary. All this suggests that it seems safe to assume they are stationary.

As Greene (2000: 725) suggests, OLS is the estimator of choice for ARDL models. In order to take into account panel heteroskedasticity and contemporaneous correlation, Beck and Katz' panel-corrected standard errors (Beck / Katz 1995) are used. An underlying fixed-effects specification with both country- and period-

10 The smallest τ-value is –6.28 for inflation in the period means-corrected specification.

specific effects takes into account both common shocks and general growth differences between the countries.

Table 1 presents three versions of the economic model without institutional effects. Model 1 is a specification with a first-order lag structure on unemployment and a second-order lag structure on inflation and productivity. Current unemployment, both lags of inflation, and the first lag of productivity turn out to be insignificant. Only lagged unemployment and a first-order structure on inflation and productivity are therefore assumed to matter.[11] Nevertheless, model 2, which restricts these coefficients to zero, reveals nonsignificant first-order effects for inflation and productivity. As a result, model 3 presents the reference model for the subsequent institutional model, which, as will become apparent, is based on the same lag specification. Noteworthy is a moderate autoregressive component (0.27), an inverse relationship between unemployment and wages, a strong current nexus between inflation and wages, and a moderate effect of productivity on wages. The direction of these relationships is as expected and it is therefore not necessary to discuss these findings in more detail, because the model simply serves as a reference specification for the institutional model presented below.

With regard to the fixed country and period effects, all three specifications suggest that the period effects are relevant but the country effects are not. This may be interpreted in two ways: On the one hand, the model might be regarded as sufficiently well specified to be valid across space, but not across time. Hence it would be concluded that country averages do not differ. On the other hand, the size of variation within a country may be too large to allow the country effects to become significant. Hence a factor should be sought that captures variation within a country. One candidate would be the bargaining mode, which differs within countries across time. If the bargaining mode (which groups countries at different points in time) is relevant, its effect should be significant and leave the remaining variation to the country effects, which might then become significant.

11 Note that the second lag of productivity is significant in this specification. However, I exclude it here in order to make this model compatible with institutional specifications presented below where this coefficient is no longer significant. A substantive interpretation of the statistical significance of this coefficient might suggest a staggered adjustment process in which wages adjust partly to expected and partly to experienced productivity growth.

Table 1 The Economic Determinants of Wage Growth

	Model 1	Model 2	Model 3
W_{t_1}	0.29***	0.29***	0.27***
	(0.06)	(0.06)	(0.05)
UE	–0.15	–	–
	(0.16)		
UE_{t_1}	–0.35**	–0.51***	–0.53***
	(0.16)	(0.14)	(0.14)
INF	0.67***	0.67***	0.66***
	(0.07)	(0.07)	(0.06)
INF_{t_1}	–0.01	–0.04	–
	(0.09)	(0.08)	
INF_{t_2}	–0.03	–	–
	(0.06)		
PTY	0.28***	0.26***	0.26***
	(0.07)	(0.07)	(0.07)
PTY_{t_1}	–0.07	–0.05	–
	(0.07)	(0.07)	–
PTY_{t_2}	0.16**	–	–
	(0.07)		
F-test Fixed Country Effects	0.64	0.91	0.89
	[0.88]	[0.58]	[0.59]
F-test Fixed Period Effects	3.90***	5.88***	6.42***
	[0.00]	[0.00]	[0.00]
Adj. R^2	0.87	0.87	0.87
SSR	2167.85	2219.23	2224.40
N Estimated Coefficients	54	51	49
N Observations	509	509	509

Notes: Country and Period Effects included; intercept suppressed due to use of full set of country dummies. Panel corrected standard errors (Beck and Katz 1995) in parentheses. Dependent variable = Annual growth rates of nominal labor costs.

W = Annual growth rates of nominal labor costs;
UE = annual differences in unemployment;
INF = Annual growth rates of the consumer price index;
PTY = Annual growth rates of volume GDP per employee;
Data source: OECD Economic Outlook, 1999, and previous editions.

*** = significance level 0.01;
** = significance level 0.05;
* = significance level 0.10 (all two-sided tests).

All predictor variables except dummies are overall mean-centered.
Adj. R^2 = Regression coefficient adjusted for degrees of freedom.
SSR = Sum of Squared Residuals.
F-tests against null-hypothesis that all country/period intercepts are equal; significance level in square brackets.

3.2 Bargaining Modes as Intervening Variables

If the parameters of the model are driven by differences in bargaining modes, a model which estimates bargaining mode-specific coefficients should be able to capture variation not only in the growth rates of labor costs but also in the model parameters. Assuming that the impact of the exogenous variables is identical within one bargaining mode but differs across modes, while the differences between countries are negligible, it is possible to estimate bargaining mode-specific autoregressive components and coefficients of exogenous variables. The bargaining modes are thus used to make a statement in substance about the impact of the economic variables. It is assumed, however, that the impact multiplier – the autoregressive coefficient – is the same for all exogenous variables. Hence the starting model has the following form:

$$
\begin{aligned}
W_{it} = & \sum_{m=1}^{M}(\delta_m BM_{it}) + \sum_{m=1}^{M}(\gamma_{1m} W_{it-1}) + \sum_{m=1}^{M}(\gamma_{2m} W_{it-2}) \\
& + \sum_{m=1}^{M}(\beta_{1m} UE_{it}) + \sum_{m=1}^{M}(\beta_{2m} UE_{it-1}) + \sum_{m=1}^{M}(\beta_{3m} UE_{it-2}) \\
& + \sum_{m=1}^{M}(\beta_{4m} INF_{it}) + \sum_{m=1}^{M}(\beta_{5m} INF_{it-1}) + \sum_{m=1}^{M}(\beta_{6m} INF_{it-2}) \\
& + \sum_{m=1}^{M}(\beta_{7m} PTY_{it}) + \sum_{m=1}^{M}(\beta_{8m} PTY_{it-1}) + \sum_{m=1}^{M}(\beta_{9m} PTY_{it-2}) \\
& + \sum_{i=1}^{N-1}(\phi_i v_i) + \sum_{t=1}^{T-1}(\xi_t w_t) + \varepsilon_{it}
\end{aligned}
$$

where W = nominal labor costs, BM = bargaining mode, UE = unemployment, INF = consumer price inflation, and PTY = productivity growth. Further, δ, γ_1, γ_2, β_{1-9}, ϕ, and ξ are coefficients, m is a counter of $M = 5$ bargaining modes, i is a counter of $N = 20$ countries, t is a counter of T periods (depending on the number of lags included), v_i refers to the fixed country effects, and w_t to the fixed period effects. This model is inspired by the SUR approach, but differs from the classical specification by replacing country-specific coefficient estimates by bargaining mode-specific coefficients. Hence countries are only entered as country-specific variations in the intercept ($\phi_i v_i$). In other words, it is assumed that the bargaining modes override country effects on the coefficient estimates.[12] This implies that an interpretation of the model with respect to the relative performance of countries needs to start from the bargaining mode prevailing during a specific period (see Appendix).

12 Strictly speaking, it would be necessary to test the specification used in this paper against a less restricted specification which includes country-specific coefficient estimates as well. However, the number of coefficients estimated in such a model definitely exceeds any sensible k:N ratio.

3.3 Hypotheses

Since the autoregressive component is defined as the discounting factor in the autocorrelation function, it tells us how much of a change in the exogenous variables at period *t* is transmitted to period *t*+1. In other words, the autoregressive coefficient refers to the speed of adjustment of labor costs to changing conditions and can be interpreted as an indicator of adaptability of wage growth. Adaptability of the system becomes higher as the coefficient approaches zero. A coefficient approaching plus or minus one is indicative of low labor market adaptability, whereby positive values indicate a smooth adaptation process and negative values refer to an oscillating pattern, indicating a more turbulent process. If the coefficient is equal to or larger than unity, the process is nonstationary, which indicates that labor costs do not return to their long-term equilibrium growth path after external shocks under the conditions of specific bargaining modes.

Two bargaining modes are clear candidates for high adaptability: uncoordinated bargaining and pattern setting. Uncoordinated bargaining, which is the closest real-world approximation to the atomistic labor market, should be able to adapt instantly to external shocks since trade unions are not expected to be able to impose their wage interests on employers (Calmfors / Driffill 1988). In contrast, pattern setting is a bargaining mode in which the sector with the strongest interests in world market competitiveness sets the going rate regardless of the feasibility of higher wage increases in other sectors (Traxler / Kittel 2000). Since the rather decentralized nature of coordination which characterizes pattern setting allows for a large amount of variation in wage increases across the economy, external shocks should be quickly absorbed.[13]

The story is different for peak-level coordination. Since central wage agreements are the result of bargaining processes in which all sectors are involved, it is considerably more difficult, first, to reach an agreement at all and, second, to enforce the compromise vis-à-vis sectoral or firm-level units (Traxler / Kittel 2000). Lower adaptability should thus be expected in all forms of central coordination. While in the case of high governability peak-level coordination only faces the wider coordination problems, central coordination with low governability also has to cope with lower-level militancy, and wage drift is expected to be higher. Hence, in this case, the lack of an enforcement mechanism is expected to additionally decrease adaptability.

This implies the following hypothesis: We should expect the categories representing uncoordinated bargaining and pattern setting to reach autocorrelation co-

13 Note that this proposition runs counter to the expectation of Calmfors-Driffill (1988) that intermediately centralized bargaining systems should perform less well.

efficients near zero, to be followed, at some distance, by voluntary peak-level coordination with high bargaining governability. By contrast, the category of peak-level coordination with low governability should have an autocorrelation coefficient further away from zero. There are no clear expectations about state-imposed wage setting: On the one hand, the authoritative imposition of wage levels is the opposite of the free market and should thus be a case of low adaptability. On the other hand, the use of state authority is often considered necessary because of the lack of success of voluntary attempts at coordination. It is designed to bring down wage increases to a level compatible with economic circumstances (for examples in the 1970s and 1980s, see Flanagan et al. 1983; Dore, Boyer, and Mars 1994).

In a model specification conditioning wage determination on the bargaining mode, the hypothesis not only refers to the autoregressive component but also to the magnitude, size, and lag structure of the other coefficients. The expectation in this regard is that uncoordinated bargaining and pattern setting should be most responsive and thus have positive and comparatively large immediate effects with small autoregressive coefficients and short lag structures. In modes of voluntary peak-level coordination with high governability, effects should also be positive but should exhibit a somewhat slower and more spread-out process of adaptation, reflected in smaller positive coefficients with a more pronounced lag structure and higher autoregression indicating a greater degree of labor market rigidity. In contrast, voluntary peak-level coordination with low governability should be less able to respond to economic conditions –which should be reflected in smaller coefficient estimates and longer lag structures. Finally, the effect of state-imposed coordination is hard to predict. It may be a source of high rigidity, may disconnect labor costs from external effects, or may cause labor market parameters to be realigned with macroeconomic requirements.

3.4 Empirical Findings

The starting specification (not reported) does not yield statistically significant effects for the second lags of the exogenous variables, and the second autoregressive components hardly transcend the 10 percent significance level. In addition, the *F*-tests of equality of coefficients across bargaining modes reject bargaining mode-specific variation in the second lags. This suggests that the lag specification should be restricted to a single lag for each variable.

As can be seen from Table 2, which presents the model with one lag on each variable, the current values of unemployment and the lagged values of inflation and productivity growth do not significantly affect labor costs except for a weak asso-

ciation between unemployment and wages in two bargaining modes. In addition, the *F*-tests reported in the last column, which explore whether the five bargaining mode-specific coefficients can be replaced by a single coefficient for each of the variables separately, suggest that these variables do not add explanatory power. From a statistical point of view, these variables should therefore be removed from the specification.

Table 2 The Impact of Bargaining Modes on Wage Determination, Full Specification

	Peak-level Coordination Low Gov.	Peak-level Coordination High Gov.	Pattern Setting	State-imposed Coordination	Uncoordinated Bargaining	*F*-test
W_{t_1}	0.23***	0.19**	–0.00	0.39***	0.16	2.19*
	(0.09)	(0.09)	(0.13)	(0.08)	(0.17)	[0.07]
UE	0.31	–0.47*	0.12	–0.15	–0.26	1.45
	(0.27)	(0.28)	(0.53)	(0.34)	(0.28)	[0.22]
UE_{t_1}	–0.32	–0.58*	–0.79	–0.52	–0.51*	0.23
	(0.27)	(0.30)	(0.48)	(0.36)	(0.31)	[0.92]
INF	0.76***	0.65***	1.04***	0.50***	0.52**	3.29**
	(0.08)	(0.11)	(0.10)	(0.12)	(0.20)	[0.01]
INF_{t_1}	–0.04	0.09	–0.05	0.02	0.31	0.59
	(0.11)	(0.13)	(0.16)	(0.13)	(0.24)	[0.67]
PTY	0.39***	0.39***	0.80***	–0.23*	0.28	9.67***
	(0.12)	(0.12)	(0.09)	(0.14)	(0.27)	[0.00]
PTY_{t_1}	0.02	0.08	0.03	–0.07	–0.03	0.26
	(0.12)	(0.12)	(0.14)	(0.14)	(0.22)	[0.91]
BM	10.54	10.42	11.75	10.01	11.51	2.66**
	(0.80)	(0.71)	(0.75)	(0.65)	(0.55)	[0.03]
Adj. R^2		0.88	*F*-test Fixed Country Effects			1.50*
SSR		1837.42				[0.08]
N Estimated Coefficients		84	*F*-test Fixed Period Effects			6.00***
N Observations		509				[0.00]

Notes: Dependent variable = Annual growth rates of nominal labor costs. BM = Bargaining mode (for definitions see section 2.3 and the Appendix). The full set of bargaining modes replaces the intercept; hence the coefficient estimates of BM are the estimated (partly counterfactual) average level of nominal wage growth for the reference year (1971) and the reference country (US). Note that for the interpretation of these coefficient estimates, one would need to know the size of the country and period effects (not reported here for reasons of space).

Peak, Low = Peak-level Coordination with Low Bargaining Governability.
Peak, High = Peak-level Coordination with High Bargaining Governability.
F-test: Test against equality of coefficients of a variable across bargaining modes.
See Table 1 for further details.

Table 3 reports the coefficient estimates of the model resulting from this respecification, and Table 4 summarizes the estimated differences between the bargaining mode-specific coefficients together with the associated significance levels of the *t*-tests. The *F*-tests for the fixed effects provide moderate support for including country effects, which suggests that the bargaining modes have indeed taken out some variation within countries (as compared to the purely economic specification), and strong support for including period effects. As Table 3 shows, the overall *F*-test against the purely economic specification assuming a common coefficient for all bargaining modes (Table 1, model 3) is highly significant, suggesting that conditioning the economic relationships on the bargaining modes does indeed improve the explanatory power of the model. Going through Table 3 by rows reveals the patterns across bargaining modes for each of the explanatory variables. First, adaptability, represented by the autoregressive coefficient, varies significantly across most modes, as the *F*-test for lagged labor costs suggest. As expected, the coefficient is practically zero in systems based on pattern bargain ing. The coefficient is about 0.2 for systems with uncoordinated bargaining and

Table 3 Bargaining Modes and Wage Determination, Restricted Specification I

	Peak-level Coordination Low Gov.	Peak-level Coordination High Gov.	Pattern Setting	State-imposed Coordination	Uncoordinated Bargaining	*F*-test
W_{t_1}	0.23***	0.19**	–0.01	0.40***	0.21	4.78***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.15)	[0.00]
UE_{t_1}	–0.23	–0.90***	–0.88**	–0.59*	–0.38*	1.74
	(0.25)	(0.22)	(0.41)	(0.32)	(0.23)	[0.14]
INF	0.73***	0.70***	1.01***	0.50***	0.68***	3.74***
	(0.07)	(0.10)	(0.10)	(0.09)	(0.16)	[0.00]
PTY	0.38***	0.47***	0.78***	–0.23**	0.25	10.95***
	(0.12)	(0.12)	(0.09)	(0.13)	(0.24)	[0.00]
BM	10.37	10.34	11.74	9.88	11.39	2.99**
	(0.78)	(0.67)	(0.72)	(0.61)	(0.50)	[0.02]
Adj. R^2		0.88	*F*-test Fixed Country Effects			1.53*
SSR		1876.27				[0.07]
N Estimated Coefficients		69	*F*-test Fixed Period Effects			6.17***
N Observations		509				[0.00]
F-test vs. economic model		3.96***				

Notes: Dependent variable = Annual growth rates of nominal labor costs.
F-test vs. Economic Model: Comparison of the specification in this Table with model 3 in Table 1.
See Tables 1 and 2 for further details.

for both modes of central coordination. While the uncoordinated bargaining mode is not significantly different from zero, both centrally coordinated modes have a clear effect. Finally, with an autoregressive coefficient of 0.4, inertia is strongest in cases of state-imposed coordination, indicating that the data fit the rigidity hypothesis for this bargaining mode best. Hence pattern bargaining adapts most quickly to external shocks, while in the other modes part of the effect is carried over to the following years.

Second, the coefficient pattern of unemployment reveals a strong negative impact for peak-level coordination with high governability and for pattern bargaining, while the effect is considerably – albeit, as Table 4 shows, not significantly – smaller in the case of uncoordinated bargaining, state-imposed coordination, and peak-level coordination with low governability. This indicates that there are two modes in which the responsiveness of labor costs to unemployment is particularly explicit, while the nexus is weaker for the other categories.

Third, growth rates of labor costs are strongly positively related to inflation in all bargaining modes – which is not surprising given the fact that the measure used is nominal – but still reveals some significant variation across the different modes (see Table 4). The effect is practically one to one for pattern bargaining, strong for both variants of peak-level coordination and uncoordinated bargaining, but considerably weaker for state-imposed coordination.

Fourth, the responsiveness to productivity growth is particularly high in the case of pattern bargaining and significantly weaker for the two peak-level coordination modes, while in the uncoordinated bargaining mode, labor costs hardly show a noticeable reaction to productivity growth. In state-imposed coordination, the effect is even significantly negative.

The bargaining mode intercepts must be included in order not to restrict mean wage growth to make it equal for all bargaining modes. However, since they represent the effect of the bargaining modes with respect to the reference country and reference period, their values should not be taken at face value and a discussion here is superfluous.

All in all, these findings suggest that the bargaining modes clearly affect wage determination. A comparison of the columns in Table 3 reveals the patterns within the bargaining modes across variables. In contrast to the “neoliberal” assumption that decentralized and deregulated labor markets are most adaptable and responsive to external shocks, the results indicate that some modes of coordination are superior in this regard. Growth rates of labor costs not only adapt most quickly to external shocks in the case of pattern bargaining, they also show the highest responsiveness to unemployment, inflation, and productivity growth.

Table 4 Comparison of Bargaining Modes

		Peak-level Coordination High Gov.	Pattern Setting	State-imposed Coordination	Uncoordinated Bargaining
W_{t-1}	Peak-level, Low Gov.	0.04	0.24***	–0.18**	0.02
		(0.09)	(0.09)	(0.09)	(0.16)
	Peak-level, High Gov.		0.19**	–0.22**	–0.02
			(0.09)	(0.09)	(0.16)
	Pattern Setting			–0.41***	–0.21
				(0.08)	(0.16)
	State-imposed Coord.				0.20
					(0.16)
UE_{t-1}	Peak-level, Low Gov.	0.67**	0.65	0.36	0.15
		(0.31)	(0.47)	(0.39)	(0.33)
	Peak-level, High Gov.		–0.02	–0.31	–0.52*
			(0.44)	(0.35)	(0.29)
	Pattern Setting			–0.29	–0.50
				(0.48)	(0.46)
	State-imposed Coord.				–0.21
					(0.38)
INF	Peak-level, Low Gov.	0.03	–0.28**	0.23**	0.05
		(0.11)	(0.11)	(0.11)	(0.17)
	Peak-level, High Gov.		–0.31**	0.20*	0.02
			(0.12)	(0.12)	(0.17)
	Pattern Setting			0.50***	0.33*
				(0.12)	(0.18)
	State-imposed Coord.				–0.18
					(0.18)
PTY	Peak-level, Low Gov.	–0.09	–0.40**	0.61***	0.13
		(0.16)	(0.15)	(0.17)	(0.27)
	Peak-level, High Gov.		–0.31**	0.71***	0.22
			(0.14)	(0.16)	(0.26)
	Pattern Setting			1.01***	0.53**
				(0.15)	(0.24)
	State-imposed Coord.				–0.48*
					(0.27)
BM	Peak-level, Low Gov.	0.03	–1.39*	0.49	–1.02
		(0.70)	(0.79)	(0.59)	(0.74)
	Peak-level, High Gov.		–1.40***	0.46	–1.05*
			(0.49)	(0.46)	(0.62)
	Pattern Setting			1.86***	0.35
				(0.61)	(0.73)
	State-imposed Coord.				–1.51**
					(0.61)

Notes: Entries are differences in coefficient estimates between bargaining modes, based on the model presented in Table 3, standard errors of these differences in parentheses. E.g.:

$\beta(W_{t-1})_{\text{peak-level, low gov.}} - \beta(W_{t-1})_{\text{peak-level, high gov.}} = 0.23 - 0.19 = 0.04$.

See Tables 1 and 2 for further details.

Since in two of the countries belonging to this category for longer spells of the period investigated – Germany and Austria – wage growth is explicitly linked to productivity growth in the wage negotiations (Jacobi et al. 1998; Traxler 1998), this finding suggests that these coordination efforts were successful. Performance of peak-level coordination with high governability is similar, though less explicit. The immediate responsiveness to unemployment, inflation, and productivity growth is somewhat smaller, and a small amount of stickiness spreads out the effect over time.

Still smaller is the immediate responsiveness of labor costs to inflation and productivity growth in the case of peak-level coordination with low governability, while there is no significant effect of unemployment. By contrast, uncoordinated bargaining reveals a small and only marginally significant effect of unemployment and a smaller impact of inflation, while productivity growth appears to be irrelevant. Lastly, state-imposed coordination turns out to be the most rigid and inconsistent mode in terms of speed of adjustment, with an average effect of unemployment, the smallest effect of inflation, and a negative effect of productivity growth. This may be interpreted in two ways: on the one hand, the authoritative imposition of general wage regulations is the opposite of flexibility and adaptability, suggesting that the inconsistency of the coefficient estimates could be traced back to the rigidity of the system. On the other hand, causality may run counter to the argument if state authority intervenes in order to moderate wage pressure after the bargaining parties failed to come to an agreement.

Variation across bargaining modes in long-run solutions – which can be calculated by $\beta/(1-\gamma)$ – is smaller, particularly for the effect of inflation (with estimated long-run coefficients covering the range 0.83–1.00) and, to a lesser degree, productivity (covering the range 0.32–0.77).[14] This suggests that, particularly for inflation, short-term responsiveness and reactivity jointly lead to rather similar long-term results: if reactivity is fast, responsiveness tends to be high and vice versa.

As discussed above, the use of current inflation rates as explanatory variables might be debatable from a theoretical perspective because, at the time of wage-fixing, the current inflation rates are unknown and negotiators therefore have to base their claims on the lagged inflation rates. In order to explore this possibility, Table 5 presents a second variant of the restricted model which substitutes the current inflation rates for the lagged ones. Some changes with respect to the findings from Table 3 are considerable: In the case of pattern setting, the autore-

14 Strictly speaking, solving for long-run solutions should take into account the probability of a country using a particular bargaining mode. This implies the need for a model for these probabilities which is currently unavailable. I would like to thank Ron Smith for alerting me to this problem.

Table 5 Bargaining Modes and Wage Determination, Restricted Specification II

	Peak-level Coordination Low Gov.	Peak-level Coordination High Gov.	Pattern Setting	State-imposed Coordination	Uncoordinated Bargaining	*F*-test
W_{t_1}	0.37***	0.25***	0.24**	0.42***	0.20	1.13
	(0.10)	(0.09)	(0.12)	(0.08)	(0.18)	[0.34]
UE_{t_1}	–0.48*	–1.04***	–0.84	–0.18	–0.70**	1.17
	(0.29)	(0.25)	(0.56)	(0.35)	(0.31)	[0.32]
INF_{t_1}	0.40***	0.32***	0.34**	0.27***	0.44***	0.37
	(0.10)	(0.12)	(0.17)	(0.10)	(0.21)	[0.83]
PTY	0.11	0.26*	0.61***	–0.34**	0.17	6.88***
	(0.14)	(0.14)	(0.13)	(0.14)	(0.30)	[0.00]
Intercept	10.48	10.46	12.11	9.97	11.18	2.15*
	(1.02)	(0.81)	(0.89)	(0.76)	(0.65)	[0.07]
Adj. R^2		0.83	*F*-test Fixed Country Effects			2.14***
SSR		2689.85				[0.08]
N Estimated Coefficients		69	*F*-test Fixed Period Effects			10.54***
N Observations		509				[0.00]

Notes: Dependent variable = Annual growth rates of nominal labor costs.
See Tables 1 and 2 for further details.

gressive component now becomes significant, while the coefficient of unemployment becomes insignificant, although it remains in the same order of magnitude. Further, the impact of lagged inflation is considerably lower than that of current inflation. Three of the four *F*-statistics which are significant in Table 3 are insignificant in Table 5. Apart from that, the coefficients are not substantially affected by the change in specification. However, both the decline in significance of the *F*-tests and the now considerably increased sum of squared residuals (from 1876.27 to 2689.85) are evidence of a considerable decline in the overall fit of the model. For these reasons, I tend to dismiss the model as inferior to the one presented in Table 3 and conclude that the evidence for a more immediate adjustment of wages to inflation is stronger.

4 Conclusion

Wage bargaining affects the way wages are determined by unemployment, inflation, and productivity growth. Three dimensions of the wage determination process are relevant here: the speed of adjustment, the size of the coefficient, and the

lag structure. According to the final model, the lag structure is simple. There is no evidence of distributed lags – a single effect captures all variation that is attributable to these three factors, and no relevant bargaining mode-specific differences in the lag structure are discernible. Wages respond to shocks in inflation and productivity growth within the same year and to shocks in unemployment with a one-year lag. This difference is consistent with the above reasoning that inflation and productivity growth are forward-looking elements of wage negotiations and define the range of possible outcomes, hence the current effect, and that unemployment determines the power of labor at the moment of wage negotiations, hence the lagged effect.

The size of the coefficient refers to the strength of the effect. In all instances, pattern bargaining and, with a small discount, peak-level coordination with high governability exhibit the largest impact of unemployment, inflation, and productivity growth on wage growth. This contrasts with uncoordinated bargaining and peak-level coordination with low governability. This result can also be explained within the framework of analysis: both modes with a strong impact are explicitly designed for economy-wide coordination, and wage deals are geared toward meeting macroeconomic exigencies, while firm- and sectoral-level or group-specific wage bargaining is dominant in the other two categories, irrespective of attempts at central coordination.

The practically immediate response of wages to the economic conditions in the case of pattern setting confirms the high reactivity and responsiveness of wage setting in this mode. Uncoordinated bargaining is somewhat more rigid, although variation is too large to distinguish the coefficient from zero. In contrast, speed of adjustment is clearly slower in the case of peak-level and state-imposed coordination, indicating the greater rigidity of these modes.

These results question the neoliberal claim that organized labor markets perform worse than those unrestricted by regulations and trade union power. At least for the macroeconomic level, this paper shows that countries with uncoordinated labor markets respond less flexibly to external shocks than those that rely on pattern setting or, to a somewhat lesser degree, on peak-level coordination. In the latter case, however, the crucial precondition for the ability of a country to reap the beneficial effects of wage bargaining coordination is the existence of legal support to enforce central wage agreements. These findings can thus be read as being supportive of the proposition that not only does wage coordination not necessarily create excessive rigidity, but that it may even improve the ability of countries to adapt rather quickly and smoothly to changing economic conditions. As far as the experience from the period 1971–1996 is concerned, there is therefore little to be said in favor of dismantling bargaining institutions as a means of improving labor market performance if they have adapted the bargaining mode to the exigencies of the market.

References

Bean, Charles R., 1994: European Unemployment: A Survey. In: *Journal of Economic Literature* 32, 573–619.

Beck, Nathaniel / Jonathan Katz, 1995: What to do (and not to do) with Time-Series Cross-Section Data. In: *American Political Science Review* 89(3), 634–647.

Beck, Nathaniel / Jonathan Katz, 1996: Nuisance vs. Substance: Specifying and Estimating Time-Series Cross-Section Models. In: *Political Analysis* 6, 1–34.

Bertola, Giuseppe / Richard Rogerson, 1997: Institutions and Labor Reallocation. In: *European Economic Review* 41, 1147–1171.

Blanchard, Olivier / Lawrence F. Katz, 1997: What We Know and Do Not Know About the Natural Rate of Unemployment. In: *Journal of Economic Perspectives* 11(1), 51–72.

Blanchard, Olivier / Justin Wolfers, 2000: The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence. In: *The Economic Journal* 110 (462), C1.

Blanchflower, David G. / Andrew J. Oswald, 1994: *The Wage Curve*. Cambridge: MIT Press.

Calmfors, Lars / John Driffill, 1988: Bargaining Structure, Corporatism and Macroeconomic Performance. In: *Economic Policy* 6, 13–61.

Clegg, Andrew / Paul Boreham / Geoff Dow, 1986: *Class, Politics and the Economy*. London: Routledge.

Compston, Hugh, 1997: Union Power, Policy Making, and Unemployment in Western Europe, 1972–1993. In: *Comparative Political Studies* 30(6), 732–751.

Culver, Sarah E. / David H. Papell, 1997: Is there a Unit Root in the Inflation Rate? Evidence from Sequential Break and Panel Data Models. In: *Journal of Applied Econometrics* 12, 435–444.

Dore, Ronald / Robert Boyer / Zoe Mars (eds.), 1994: *The Return to Incomes Policy*. London: Pinter.

Flanagan, Robert J., 1999: Macroeconomic Performance and Collective Bargaining: An International Perspective. In: *Journal of Economic Literature* 37(3), 1150–1175.

Flanagan, Robert J. / David Soskice / Lloyd Ulman, 1983: *Unionism, Economic Stabilisation and Income Policies. European Experiences.* Washington DC: Brookings Inst.

Freeman, Richard B., 1998: War of the Models: Which Labour Market Institutions for the 21st Century? In: *Labour Economics* 5, 1–24.

Golden, Miriam, 1993: The Dynamics of Trade Unionism and National Economic Performance. In: *American Political Science Review* 87(2), 439–454.

Greene, William, 2000: *Econometric Analysis*, 4th ed. Upper Saddle River, NJ: Prentice Hall.

Hall, Peter / Robert J. Franzese, 1998: Mixed Signals: Central Bank Independence, Coordinated Wage Bargaining, and European Monetary Union. In: *International Organization* 52(3), 505–535.

Hassel, Anke, 2001: *The Politics of Social Pacts*. Unpublished Manuscript. Cologne: Max-Planck-Institut für Gesellschaftsforschung.

Iversen, Torben, 1999: *Contested Economic Institutions: The Politics of Macroeconomics and Wage Bargaining in Advanced Democracies*. Cambridge: Cambridge University Press.

Jacobi, Otto / Berndt Keller / Walther Müller-Jentsch, 1998: Germany: Facing New Challenges. In: Anthony Ferner / Richard Hyman (eds.), *Changing Industrial Relations in Europe*. Oxford: Blackwell, 190–238.

Kenworthy, Lane, 2000: *Quantitative Indicators of Corporatism: A Survey and Assessment*. MPIfG Discussion Paper 00/4. Cologne: Max-Planck-Institut für Gesellschaftsforschung.

Kittel, Bernhard, 2000: Trade Union Bargaining Horizons in Comparative Perspective: The Effect of Encompassing Organization, Unemployment, and the Monetary Regime on Wage-Pushfulness. In: *European Journal of Industrial Relations* 6(2), 181–202.

Layard, Richard / Stephen Nickell / Richard Jackman, 1991: *Unemployment. Macroeconomic Performance and the Labour Market*. Oxford: Oxford University Press.

Lindbeck, Assar / Dennis Snower, 2001: Insiders versus Outsiders. In: *Journal of Economic Perspectives* 15(1), 165–188.

Maddala, G. S. / In-Moo Kim, 1998: *Unit Roots, Cointegration, and Structural Change*. Cambridge: Cambridge University Press.

Maddala, G. S. / Shaowen Wu, 1999: A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. In: *Oxford Bulletin of Economics and Statistics* 61(4) Supplement, 631–652.

Mitchell, Daniel J. B., 1993: Keynesian, Old Keynesian, and New Keynesian Wage Nominalism. In: *Industrial Relations* 32(1), 1–29.

Moene, Karl Ove / Michael Wallerstein / Michael Hoel, 1993: Bargaining Structure and Economic Performance. In: Robert J. Flanagan / Karl Ove Moene / Michael Wallerstein, *Trade Union Behavior, Pay-Bargaining, and Economic Performance*. Oxford: Clarendon Press, 63–131.

Newbery, David M. / Joseph E. Stiglitz, 1987: Wage Rigidity, Implicit Contracts, Unemployment and Economic Efficiency. In: *The Economic Journal* 97: 416–430.

Nickell, Steven, 1997: Unemployment and Labor Market Rigidities: Europe versus North America. In: *Journal of Economic Perspectives* 11(3), 55–74.

Nickell, Stephen, 1998: Unemployment: Questions and Some Answers. In: *The Economic Journal* 108, 802–816.

Nickell, Stephen / Richard Layard, 1997: *Labour Market Institutions and Economic Performance*. Discussion Paper Series "The Labour Market Consequences of Technical and Structural Change" No. 23. Oxford: Centre for Economic Performance.

OECD, 1997: Economic Performance and the Structure of Collective Bargaining. In: *OECD Employment Outlook*, Paris: OECD, 64–92.

Offe, Claus / Helmut Wiesenthal, 1985: Two Logics of Collective Action. In: Claus Offe, *Disorganized Capitalism. Contemporary Transformations of Work and Politics*. Oxford: Polity Press, 170–220.

Rueda, David / Jonas Pontusson, 2000: Wage Inequality and Varieties of Capitalism. In: *World Politics* 52(3), 350–383.

Regalia, Ida / Marino Regini, 1998: Italy: The Dual Character of Industrial Relations. In: Anthony Ferner / Richard Hyman (eds.), *Changing Industrial Relations in Europe*. Oxford: Blackwell, 459–503.

Siebert, Horst, 1997: Labor Market Rigidities: At the Root of Unemployment in Europe. In: *Journal of Economic Perspectives* 11(3), 37–54.

Smith, Ron, 2000: Estimation and Inference with Non-stationary Panel Time-series Data. Paper presented at the 5th International Conference on Social Science Methodology, International Sociological Association, University of Cologne, 3-6 Oct.. Cologne: Central Archive for Empirical Social Research, University of Cologne.

Traxler, Franz, 1998: Austria: Still the Country of Corporatism, in: Anthony Ferner / Richard Hyman (eds.), *Changing Industrial Relations in Europe*. Oxford: Blackwell, 239–261.

Traxler, Franz / Sabine Blaschke / Bernhard Kittel, 2001: *National Labour Relations in Internationalized Markets. A Cross-National Analysis of Institutional Patterns, Change and Performance*. Oxford: Oxford University Press.

Traxler, Franz / Bernhard Kittel, 2000: The Bargaining System and Performance: A Comparison of 18 OECD Countries. In: *Comparative Political Studies* 33(9), 1154–1190.

Wallerstein, Michael, 1998: *Wage-Setting Institutions and Pay Inequality in Advanced Industrial Societies*. In: American Journal of Political Science 43(3), 649–680.

Appendix

Bargaining Modes and Bargaining Governability in 20 OECD Countries, 1970–1996, Summary of Period Averages

	1970–73	1974–76	1977–79	1980–82	1983–85	1986–90	1991–93	1994–96
Germany	2	2	3	3	3	3	3	3
France	4	4	4	4	4	4	4	4
Italy	1	1	1	1	1	1	1	1
Netherlands	2	4	2	4	2	2	2	2
Belgium	1	1	1	4	4	1	1	4
United Kingdom	5	1	1	5	5	5	5	5
Ireland	1	1	1	1	1	1	1	1
Denmark	2	4	4	3	2	2	2	2
Spain	–	–	1	1	1	1	1	1
Portugal	–	4	4	4	1	1	1	1
United States	3	5	5	5	5	5	5	5
Canada	5	4	4	5	5	5	5	5
Japan	3	3	3	3	3	3	3	3
Australia	4	4	4	4	2	2	2	2
Norway	2	2	4	4	2	2	2	2
New Zealand	4	4	4	2	2	2	5	5
Sweden	2	2	2	2	2	2	2	5
Finland	2	2	2	2	2	2	2	5
Switzerland	2	2	2	2	2	2	2	2
Austria	2	2	2	2	3	3	3	3

Notes: Bargaining modes:
1 = peak-level coordination with low governability;
2 = peak-level coordination with high governability;
3 = Pattern setting;
4 = State-imposed coordination;
5 = uncoordinated bargaining;
– = Not applicable.
Modal value of period, based on annual observations.

Source: Traxler, Blaschke, and Kittel (2001).